

**We Claim**

1. A method of generating a multifidelity model of a system, comprising the steps of:
  - 5 (a) obtaining training data from a high fidelity model of the system;
  - (b) providing a low fidelity model of the system, the low fidelity model having adjustable weightings for respective input parameters to the low fidelity model;
  - 10 (c) providing a compensation model to compensate for discrepancies between the high and low fidelity models;
  - (d) adjusting the compensation model and the weightings to optimise the correlation of the low fidelity model, when compensated by the compensation model, with said training data;
  - 15 and
  - (e) generating a multifidelity model of the system based on the adjusted low fidelity model when compensated by the adjusted compensation model.
2. A method of generating a multifidelity model according to claim 1, wherein the compensation model is a kriging model.
- 20 3. A method of generating a multifidelity model according to claim 1, wherein the compensation model is a neural network.
4. A method of generating a multifidelity model according to claim 1, wherein the system comprises a gas turbine engine or a part of a gas turbine engine.
- 25 5. A method of generating a multifidelity model according to claim 4, wherein the part of the gas turbine engine comprises a bearing housing.
6. A method of generating a multifidelity model according to claim 1, wherein the model is selected from the group comprising stress, strain, fluid flow and thermal.
- 30 7. Computer readable program code for implementing the method of claim 1.
8. Computer readable media carrying program code for implementing the method of claim 1.
- 35 9. A computer system operatively configured to implement the

method of claim 1.

10. Computer readable program code for implementing a multifidelity model generated using the method of claim 1.

11. A method of generating a multifidelity model of a system,  
5 comprising the steps of:

(a) obtaining training data from a high fidelity model of the system;

(b) providing a low fidelity model of the system;

(c) providing a kriging model to compensate for  
10 discrepancies between the high and low fidelity models;

(d) adjusting the kriging model to maximise the likelihood of said training data when the low fidelity model, compensated by the kriging model, is used to model the system; and

(e) generating a multifidelity model of the system based  
15 on the low fidelity model when compensated by the adjusted kriging model.